Space Weather Forecast

Issued on Monday, 27 February 2023 at 01:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor to G2/Moderate storms expected, and chance G3/Strong storms 27-28 Feb. R1-R2 Blackouts likely throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with several low levels C-class flares in the last 24 hours. There are eight sunspot regions on the visible disc. Three of which are of note. A large and long spot with a complex magnetic configuration near north-centre disk. A spot in the southwest quadrant, and as spot in the northwest which has been the the source of the two recent coronal mass ejections. A new region has recently rotated onto the northeast of the disk, current analysis has this as a small and simple region. The other remaining regions on the disc are also small and simple.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of the arrival of a coronal hole fast wind followed by a coronal mass ejection. Solar winds rose erratically from slightly elevated to string. The total interplanetary magnetic field strength, started weak, becoming mostly moderate from 26/0845 UTC, then strong but on a declining trend from 26/1845 UTC when the coronal mass ejection arrived. The north-south component was weakly positive, then became moderately negative from 26/1900 UTC. Geomagnetic activity was mostly Unsettled (Kp 3) before rising to G1/Minor (Kp5) then G2/ Moderate (Kp 6) storm levels to end the period.

Energetic Particles / Solar Radiation: The count rate of energetic particles increased due to the arrival of high energy protons from the Moderate flare and filament eruption. This is currently still rising, but breached the S1 Minor Storm threshold at 25/2110 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is considered likely, with Moderate-class flares (R1-R2), and a slight chance of increasing to High if any X-flares occur (R3).

Solar Wind / Geomagnetic Activity: A coronal mass ejection left the Sun on 25 Feb from a sunspot in the northwest quadrant. The arrival of which is expected to be during the second half of 27 Feb or perhaps on 28 Feb.

The Earth is currently under the combined effects of the fast wind of coronal hole 79 and a coronal mass ejection from the 24 Feb. Solar wind speeds are expected to gradually decline through 27 Feb back to Elevated before the arrival of the coronal mass ejection from 25 Feb, raising wind speeds to Strong once again. Speeds then waning though 01 and 02 Mar back to Slightly Elevated or Background.

Geomagnetic activity is currently at G2/Moderate storm levels, with a continued risk of G3/Strong Storm intervals early in the period. Coronal mass ejection effects are expected to ease, allowing geomagnetic activity to return to Unsettled or Active during 27 Feb before the coronal mass ejection from 25 Feb arrives, bringing further G1/Minor or G2/Moderate storms and a chance of G3/Strong storms later on 27 Feb or on 28 Feb. Geomagnetic activity should then decline from 01 Mar, back to Quiet to Active, with a reducing chance of G1/Minor storms.

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Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has now fallen below the S1 Minor Storm level. There is a reducing chance of further proton events through the period, as levels continue declining towards background conditions, only increasing again should any significant flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	80	70	30	10
Strong	G3	No	30	30	5	1
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	50	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	40	20	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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